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PATENT SPECIFICATION



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COMPLETE SPECIFICATION

Improvements in or relating to Machines for Packaging a
Commodity

I, HARRY FRANKLIN WATERS, a citizen of the United States of America, of 45, East 45th Street, City and State of New York, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

10 The present invention relates to a machine for packaging a commodity.

The present invention also relates to an improved apparatus for filling and sealing bags and like containers wherein the bag is closed and sealed simultaneously with the exhaustion of air from the container.

According to the present invention there is provided a machine for packaging a commodity in a flexible-walled bag, which comprises means for withdrawing gases from the filled bag, including a hollow member having at least one of its cross-sectional dimensions a small fraction of the corresponding dimension of said bag mouth, said hollow member being adapted to be inserted into the mouth of said filled bag, means for flattening the terminal regions of said mouth about said member, thereby to displace the major portion of said regions into opposed face to face sealing position approximating the final sealing position, means for transversely flattening said mouth in a zone below and adjacent to said first flattening means, thereby to complete displacement of said bag mouth into final sealing position, and means for permanently sealing said bag in said zone.

The invention provides also a machine for packaging a commodity in a flexible-walled bag fusible on at least the inner face thereof, which comprises means for withdrawing gases from the filled bag, including a hollow member having at least one of its cross-sectional dimensions a small fraction of the corresponding dimension of said bag mouth, said hollow member being adapted to be inserted into the mouth of said filled bag, temporary sealing means for flattening the terminal regions of the bag mouth about said member in a first transverse zone, whereby to

displace the major portion of such regions into face to face sealing position approximating the final sealing position, and permanent sealing means for heating and flattening said mouth in a second transverse zone adjacently parallel-spaced from said first zone but below the end of said hollow member, thereby to complete displacement of said bag mouth into final sealing position and to cause fusion of the inner face and hermetic sealing of the bag.

A heat sealing device is provided for securing together overlapped edges of material wherein the device comprises essentially two elements, one heat sealing element and the other a backing roll or member made of resilient material, as for example rubber. By the provision of such backing member a perfect seal is insured in spite of variations in the manner in which the edges are overlapped due primarily to the fact that the resilient backing roll will exert a constant pressure on the overlapped area to force this area firmly against the heat applying roll.

Means are also provided for closing bags made of liquid-proof material. The bag or other container, after being filled with the desired material, is subjected to vacuum to exhaust the air remaining in the bag, and, after the air has been exhausted and while the vacuum is still being applied, the bag is sealed by the application of heat. By this means the necessity for multi-stage sealing and filling of the bags is avoided.

If desired any suitable inert gas may be allowed to replace the vacuum created in the bag. After the gas has been supplied and during the time that the bag is operatively connected with the gas supplying means the end of the bag is sealed by heat, thereby insuring a complete packaging of the bag.

In the practice of the invention, it is intended that bags manufactured of paper coated with a fusible substance or bags made of material which is inherently fusible, such as that sold under the Registered Trade Mark "Pliofilm," or bags made of a base sheet such as regenerated cellulose and coated with a fusible sub-

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stance, be used. It will of course be apparent that the coating applied to the base sheet may extend only throughout the area which is to be sealed by the application of heat, or may extend throughout one surface of the sheet or both surfaces of the sheet.

In order that the invention may be fully understood, it will now be described with reference to the accompanying drawings, in which:—

Fig. 1 is a schematic representation of a machine embodying the invention, the view representing a cross section through the machine;

Fig. 2 is a front view partially in cross section of the machine taken along line 2—2 of Fig. 1;

Fig. 3 is a partial view corresponding to Fig. 1 showing a following step in the operation of the machine;

Fig. 4 is a partial cross section of Fig. 2 taken along lines 4—4;

Fig. 5 is an enlarged partial view of an element of the machine; and

Fig. 6 is a cross section of a modified form of element.

Referring to the drawing, there is schematically represented the closing unit of a bag closing machine. Bags 10, positioned in the machine, are filled with a predetermined quantity of material as represented at 11. The open mouth of the bag projects above the contained material and is sealed by the mechanism of the present invention. The bags are supported on a conveyor 12 of suitable construction, preferably an endless belt supported by rollers 13, the belt passing about a driving roll 14 intermittently revolved by a star wheel 15 and a driving wheel 16 of the usual type.

During a dwell in the forward progress of the bags each of the bags is closed by means of the following mechanism: As stated above, the bags are preferably formed of a fusible material or have coatings of fusible substances applied thereto. At 20 there is represented a heating element which, upon making contact with the material, will fuse and cement the walls of the bag together. The heating element comprises a rigid bar 20 mounted upon a thrust member 21 guided in a frame 22. The thrust member carries a cam follower 23 bearing against a driven cam 24 which reciprocates the heating element against the tension of a spring 25. The bar is suitably heated by means of a coil 26 mounted therein. Opposite the heating bar there is positioned a backing member 30 similarly mounted upon a thrust member 31 guided in a frame 32 and having a cam follower 33. The backing member is actuated by a driven cam

34 synchronized with and similar to cam 24 and is retracted by a spring 36. The backing member, in accordance with the invention, is preferably a resilient, heat-resisting member formed of the type of rubber used in steam hoses. The forward bag-contacting edges of the backing member is preferably formed with longitudinal ribs 37 which will create undulations in the sealed area, thereby effecting a tight seal. The cams 24 and 34 are synchronized with the driving wheel 16 so as to cause the bag mouth to be momentarily squeezed by the heating bar and the backing member during the dwell of the conveyor, thereby fusing a portion of the bag walls together. The face of the heating bar 20 is preferably formed at an incline, thereby providing a sharp edge at its upper limit and a diverging surface at its lower limit. As seen in Fig. 3, the effect of this angularity of the heating face is such that any cutting of the bag material which may occur will take place above the sealed area. In Fig. 2 the sealed area is indicated at 40. The projecting end of the bag 41 may be trimmed from the bag or folded down upon the top of the bag. The form of backing member shown in Figs. 1, 3 and 5 may be replaced by the form shown in Fig. 6, consisting of a rigid rod 45 inserted through a length of rubber tubing 46, preferably having longitudinal ribs 47. Such tubing is readily procurable being known as "steam tubing." I have consistently mentioned the backing material as being formed of rubber, but other semi-rigid, resilient and heat resisting material may be substituted, it being the discovery that a better seal is obtained by the use of such a member.

In the packaging of numerous commodities such as coffee and the like, it is imperative that the goods be preserved in their original state. It is well-known that a number of commodities may best be preserved by evacuating the air therefrom. This may be further supplemented by refilling the bag with an inert gas. It is well-known that nuts are best preserved in an atmosphere of carbon dioxide. Coffee is best preserved in a vacuum. Various substances are preserved in various other gases. By the term "inert gas" is meant whatever gas is best to use in conjunction with whatever commodity is being packaged. It is perfectly within the purview of the invention that some goods may be best preserved by maintaining them in an atmosphere of a very chemically active gas, which will nevertheless be unharmed to the particular commodity and is therefore an inert gas within the meaning.

In order to evacuate the package and/or to replace the atmosphere with an inert

gas, the following mechanism is employed: Mounted at one side of the conveyor upon a standard 60 is a hollow drum 61 pivoted at 62. An arm 63 carries a roller 64 biased against a cam 65 by a spring 66. Cam 65 is synchronized with the machine to rock the drum 61 during a dwell of the conveyor. A hollow extension of drum 61 extends over the mouth of the bag and terminates in a flattened mouth or spout 68 directly above the mouths of the bags. Upon rocking of the drum the mouth 68 is inserted into the mouth of the bag positioned immediately beneath it.

A conduit 69 leads from the drum and a valve 70 is provided therein. The valve is so actuated as to open upon the insertion of the mouth of the extension into the bag and the conduit 69 is thereby connected to means for creating a vacuum. In order that the suction shall apply only to the drum 61 and the bag there is provided clamping means comprising resilient bars 80 and 81 mounted upon rods 82 and 83, respectively, which are actuated by similar cams 84 and 85 against the tension of springs 86 and 87, respectively. The resilient bars clamp the mouth of the bag around the mouth of the extension 68, and being deformable, are capable of forming a tight seal so that the suction will evacuate the bag. As seen in Fig. 4, the bars 80, 81 press the sides of the bag against the extension 68 and likewise grip the edges of the bag beyond the extension.

Immediately upon the clamping of the bag mouth and the evacuation of the air therefrom, the valve 70 may be closed, and a valve 90 in a gas conduit 91 may be simultaneously opened, thereby forcing whatever inert gas is desired in the bag. The timing is preferably such that the inert gas is inserted into the bag just prior to the contacting of the heating bar and backing element with the sides of the bag. The momentary application of heat which follows effectively closes the bag, and thereupon the clamping bars 80 and 81 will be withdrawn and the drum 61 rotated to withdraw the extension 68 from the mouth of the bag. The next forward step of the conveyor brings the succeeding bag into position to repeat the cycle.

There has been mentioned the packaging of commodities and it will be apparent that the commodity packaged could be of liquid character as well as solid character. A feature of the invention is that even though a liquid or semi-liquid is placed in the bag, the air or other gas associated with the liquid may be withdrawn therefrom and/or an inert gas placed in association with the liquid. It has been found that the sealing of the bag may be accom-

plished by the present apparatus through the liquid itself, the resilient backing member allowing a firm seal to be formed by forcing the liquid away from the area to be sealed.

It will be understood that various changes may be made in the embodiments described without departing from the scope of the invention claimed.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. A machine for packaging a commodity in a flexible-walled bag, which comprises means for withdrawing gases from the filled bag, including a hollow member having at least one of its cross-sectional dimensions a small fraction of the corresponding dimension of said bag mouth, said hollow member being adapted to be inserted into the mouth of said filled bag, means for flattening the terminal regions of said mouth about said member, thereby to displace the major portion of said regions into opposed face to face sealing position approximating the final sealing position, means for transversely flattening said mouth in a zone below and adjacent to said first flattening means, thereby to complete displacement of said bag mouth into final sealing position, and means for permanently sealing said bag in said zone.

2. A machine for packaging a commodity in a flexible-walled bag fusible on at least the inner face thereof, which comprises means for withdrawing gases from the filled bag, including a hollow member having at least one of its cross-sectional dimensions a small fraction of the corresponding dimension of said bag mouth, said hollow member being adapted to be inserted into the mouth of said filled bag, temporary sealing means for flattening the terminal regions of the bag mouth about said member in a first transverse zone, thereby to displace the major portion of such regions into face to face sealing position approximating the final sealing position, and permanent sealing means for heating and flattening said mouth in a second transverse zone adjacently parallel-spaced from said first zone but below the end of said hollow member, thereby to complete displacement of said bag mouth into final sealing position and to cause fusion of the inner face and hermetic sealing of the bag.

3. A machine according to claim 2, including means for sequentially operating said temporary and permanent sealing means.

4. A machine according to claim 2 or 130

3, in which said temporary sealing means include a pair of elongated sealing jaws for transversely flattening the terminal regions of the bag mouth and forming a
5 substantially gas-tight seal between said terminal regions and said hollow member, thereby to displace the major portion of such regions into opposed face to face relation approximating the final sealing position, and said permanent sealing means
10 include a pair of elongated jaws for applying heat and pressure to said terminal regions in a transverse zone adjacently parallel-spaced from said first zone but
15 below the end of said hollow member.

5. A machine according to claim 4, in which said jaws are made of resilient material.

6. A machine for packaging a commodity in a flexible-walled bag, substantially as hereinbefore described and illustrated in the accompanying drawings.

Dated this 16th day of July, 1942.

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[This Drawing is a reproduction of the Original on a reduced scale.]

